

Course No. 1515

Industrial Automation & Control Systems Training Course

INDUSTRIAL AUTOMATION & DIGITAL TECHNOLOGIES
INDUSTRIAL ENGINEERING, MAINTENANCE & OPERATIONS

DURATION

5 Days

DELIVERY

Classroom



Course Overview

The Industrial Automation & Control Systems Training Course provides a comprehensive and practical framework for understanding, designing, operating, maintaining, and optimizing modern industrial automation and control environments. The course focuses on the technologies, engineering principles, operational practices, and integration methods required to control industrial processes efficiently while supporting reliability, safety, productivity, and operational continuity.

The program examines the architecture and interaction of major industrial control technologies, including Programmable Logic Controllers, Distributed Control Systems, Supervisory Control and Data Acquisition systems, Human-Machine Interfaces, sensors, actuators, industrial networks, drives, control panels, and field instrumentation. Participants will develop a clear understanding of how these technologies work together to monitor processes, execute control strategies, collect operational data, and support real-time decision-making.

A strong practical emphasis is placed on process control, automation architecture, instrumentation, industrial communication, control logic, operator interfaces, alarm management, and system integration. Participants will explore automation applications across production facilities, oil and gas operations, energy plants, utilities, manufacturing environments, water facilities, and other process industries.

The course also addresses troubleshooting, preventive maintenance, system reliability, cybersecurity, redundancy, lifecycle management, and performance optimization. Through practical exercises, industrial scenarios, and structured workshops, participants will develop the ability to assess control system requirements, identify technical issues, improve automation performance, and develop practical strategies for modernizing and maintaining industrial control environments.

Objectives

- Analyze the architecture, components, and operating principles of modern industrial automation and control systems during the course.
- Evaluate the roles of PLC, DCS, SCADA, HMI, instrumentation, drives, and industrial communication networks within automated facilities.
- Apply industrial automation principles to analyze process requirements and develop appropriate control strategies.

- Design basic automation architectures integrating controllers, field devices, operator interfaces, and industrial networks.
- Evaluate digital and analog instrumentation and their role in process measurement and control.
- Apply control logic, sequencing, interlocking, alarm management, and monitoring principles to industrial processes.
- Assess industrial communication requirements and select appropriate integration approaches for connected control systems.
- Develop systematic methods for diagnosing automation, instrumentation, communication, and control system faults.
- Evaluate cybersecurity, redundancy, maintenance, and reliability requirements for industrial control environments.
- Develop an actionable industrial automation improvement roadmap aligned with operational, safety, reliability, and performance objectives.

Who Should Attend

The Industrial Automation & Control Systems Training Course is designed for engineers, technicians, and professionals working in industrial automation, control systems, instrumentation, electrical engineering, process control, manufacturing, operations, maintenance, reliability, and operational technology. It is particularly relevant to automation engineers, control engineers, instrumentation engineers, electrical engineers, PLC specialists, DCS and SCADA specialists, industrial network professionals, control room operators, maintenance engineers, and technical specialists responsible for automated industrial systems.

The course is also suitable for plant managers, operations managers, engineering managers, maintenance managers, automation managers, reliability managers, control room supervisors, industrial project managers, and digital transformation professionals. It is highly relevant to executives and decision makers in government entities, ministries, public-sector organizations, oil and gas companies, energy organizations, utilities, manufacturing facilities, water and wastewater organizations, and large industrial corporations seeking to strengthen automation capabilities, improve control system reliability, enhance operational visibility, and support safe and efficient industrial operations.

Learning Outcomes

- Explain the architecture and functions of modern industrial automation and control systems.
- Identify the roles and relationships between PLCs, DCS, SCADA, HMIs, sensors, actuators, drives, and industrial networks.
- Analyze industrial processes and determine appropriate automation and control requirements.
- Design a basic industrial automation architecture based on process, operational, and control requirements.
- Evaluate instrumentation technologies used for measuring pressure, temperature, flow, level, and other process variables.
- Apply control logic, sequencing, interlocking, alarm, and monitoring principles to automated processes.
- Assess industrial communication and networking requirements for integrated control environments.
- Diagnose common automation, instrumentation, PLC, SCADA, DCS, and communication problems using structured troubleshooting methods.
- Develop practical approaches for maintenance, redundancy, backup, cybersecurity, and reliability improvement.
- Prepare an industrial automation improvement plan covering system performance, integration, maintenance, cybersecurity, reliability, and future modernization requirements.

Course Outline

DAY 01

Industrial Automation and Control Systems Fundamentals

- Introduction to industrial automation and control systems
- Evolution of industrial control technologies
- Automation levels and control system hierarchy
- PLC architecture and applications
- Distributed Control Systems and process automation
- SCADA systems and supervisory monitoring
- Human-Machine Interfaces and operator interaction
- Sensors, actuators, and field devices

DAY 01 — CONTINUED

- Industrial drives and control equipment

PRACTICAL APPLICATION

Analyze a representative industrial facility and map the relationships between field devices, controllers, operator interfaces, networks, and supervisory systems

DAY 02**Instrumentation, Process Control, and Automation Architecture**

- Fundamentals of industrial instrumentation
- Measurement of pressure, temperature, flow, and level
- Digital and analog signals
- Signal conditioning and transmission
- Control valves and final control elements
- Open-loop and closed-loop control
- Process control fundamentals
- Control loops and feedback principles
- Interlocking and sequence control

PRACTICAL APPLICATION

Develop a basic process control architecture and identify the required instruments, control elements, signals, and automation functions

DAY 03**PLC, DCS, SCADA, HMI, and Industrial Communication**

- PLC programming and control logic concepts
- DCS architecture and process control applications
- SCADA data acquisition and real-time monitoring
- HMI design and operator visualization
- Alarm and event management
- Industrial communication networks

DAY 03 — CONTINUED

- Common industrial communication protocols
- Controller-to-controller and system-to-system integration
- Data acquisition, historical data, and operational reporting

PRACTICAL APPLICATION

Design an integrated automation architecture connecting PLC, DCS, SCADA, HMI, instrumentation, and industrial communication systems

DAY 04

Troubleshooting, Maintenance, Reliability, and Cybersecurity

- Systematic troubleshooting methodologies
- Diagnosing instrumentation and signal problems
- PLC, DCS, and SCADA fault diagnosis
- Industrial network and communication troubleshooting
- Control loop performance and fault identification
- Preventive and predictive maintenance for automation systems
- System redundancy and availability
- Backup, recovery, and configuration management
- Industrial cybersecurity fundamentals

PRACTICAL APPLICATION

Diagnose a simulated industrial automation failure and identify technical, operational, maintenance, and cybersecurity corrective actions

DAY 05

Optimization, Modernization, and Automation Strategy

- Evaluating industrial automation system performance
- Improving control system reliability and availability
- Optimizing operator interfaces and process monitoring
- Alarm management and operational effectiveness

DAY 05 — CONTINUED

- Automation lifecycle management
- System upgrades and modernization considerations
- Integrating automation with industrial digital technologies
- Performance indicators for control and automation systems
- Developing industrial automation improvement strategies

FINAL WORKSHOP

Develop a complete industrial automation and control systems improvement roadmap covering architecture, instrumentation, control, communication, maintenance, cybersecurity, reliability, modernization, and performance objectives

Register or Request More Information

Course page: <https://quest-training.com/courses/industrial-automation-control-systems-training-course>

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